

# First Jurassic representative of the extinct family Peleserphidae (Hymenoptera, Proctotrupoidea)

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## Abstract

*Arkadiserphus leleji* Rasnitsyn, **gen. et sp. nov.**, is described from the Upper Jurassic deposits of Karatau (Kazakhstan) in the proctotrupoid family Peleserphidae hitherto known solely from the mid-Cretaceous Burmese (Kachin) amber. Taxonomic position of the genus and past distribution of the family are briefly discussed.

## Keywords

Fossil insects, Proctotrupomorpha, new taxa, Upper Jurassic

## Introduction

The family Peleserphidae is established in the superfamily Proctotrupoidea based on three fossil wasps in the Burmese (Kachin) amber arranged in three species and two genera (Zhang et al. 2018). The family was treated as aberrant within Proctotrupoidea primarily because of the modified wing venation, with RS+M extending far distally to diverge only beyond 2r-rs, so as free M mimics ‘RS<sub>2</sub>’ of Pelecinidae. Enlarged head with prognathous mouthparts and very long female hypopygium are claimed synapo-

morphic for Peleserphidae as well. Along with some others, the family was listed as endemic of the mid-Cretaceous tropical biota of the West Burma plate (Rasnitsyn and Öhm-Kühnle 2018; Zhang et al. 2018).

A far older wasp fossil from the well-known Upper Jurassic insect site in the Range Karatau (southern Kazakhstan) (cf. Rohdendorf 1968) was long waiting for proper identification among other strange wasp fossils kept at the Paleontological Institute in Moscow until recently it is identified as a member of Peleserphidae. The fossil is described herein as a new genus and species.

## Material and methods

The holotype specimen under description was collected in the Upper Jurassic deposits of Karabastau Formation near Mikhailovka village, southern Karatau Range, Kazakhstan (43.0°N, 70.0° E: paleocoordinates 41.1°N, 73.3°E according to the Fossilworks Database, [http://fossilworks.org/bridge.pl?a=collectionSearch&collection\\_no=30231](http://fossilworks.org/bridge.pl?a=collectionSearch&collection_no=30231), accessed Feb. 26, 2021) in 1967 by the field team of the Borissiak Paleontological Institute, Russian Academy of Sciences (further referred to as PIN), led by Alexander G. Sharov. The material is kept at PIN.

The holotype is photographed at PIN by Dmitry V. Vasilenko using a Leica M165C stereomicroscope with a Leica DFC 420 camera. Line drawings were made with CorelDRAW 2019 Graphic software based on the photographs.

## Results

**Order Hymenoptera Linnaeus, 1758**

**Superfamily Proctotrupoidea Latreille, 1802**

**Family Peleserphidae Zhang, Rasnitsyn, Wang & Zhang, 2018**

**Genus *Arkadiserphus* Rasnitsyn, gen. nov.**

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**Type species.** *Arkadiserphus leleji* Rasnitsyn, sp. nov.

**Diagnosis.** Head orthognathous. Antenna oligomeric (less than 15-segmented). Fore wing with pterostigma wide (about 3 times as long as wide), rudiment of 1–RS+M present, rudiment of 1m-cu lost, (M+)Cu with rudimentary kinks at 1cu-a and 2cu-a, 1cu-a postfurcal. Female hypopygium short (not much longer than other metasomal sterna).

**Remarks.** The new genus differs considerably from both previously known genera of Peleserphidae, *Peleserphus* Zhang, Rasnitsyn, Wang & Zhang, 2018 and *Peleproctus* Zhang, Rasnitsyn, Wang & Zhang, 2018, in the characters listed above: those two gen-

era have head functionally prognathous, antenna polymerous (16–21-segmented), fore wing with pterostigma narrow, 1–RS+M totally lost, in contrast with 1m-cu partially preserved, (M+)Cu with no distinct kink, 1cu-a interstitial.

**Species included.** Type only.

**Etymology.** The genus name is dedicated to Prof. Arkady Lelej, an outstanding hymenopterist and my friend.

***Arkadiserphus leleji* Rasnitsyn, sp. nov.**

<http://zoobank.org/20C11A7B-B4DE-4F19-9413-92C661D14F17>

Figure 1

**Holotype.** PIN, 2784/1225; near Mikhailovka village, southern Karatau Range, S. Kazakhstan; Karabastau Formation, Upper Jurassic; lateral imprint of whole insect with incomplete legs and obliterate details of body structure.

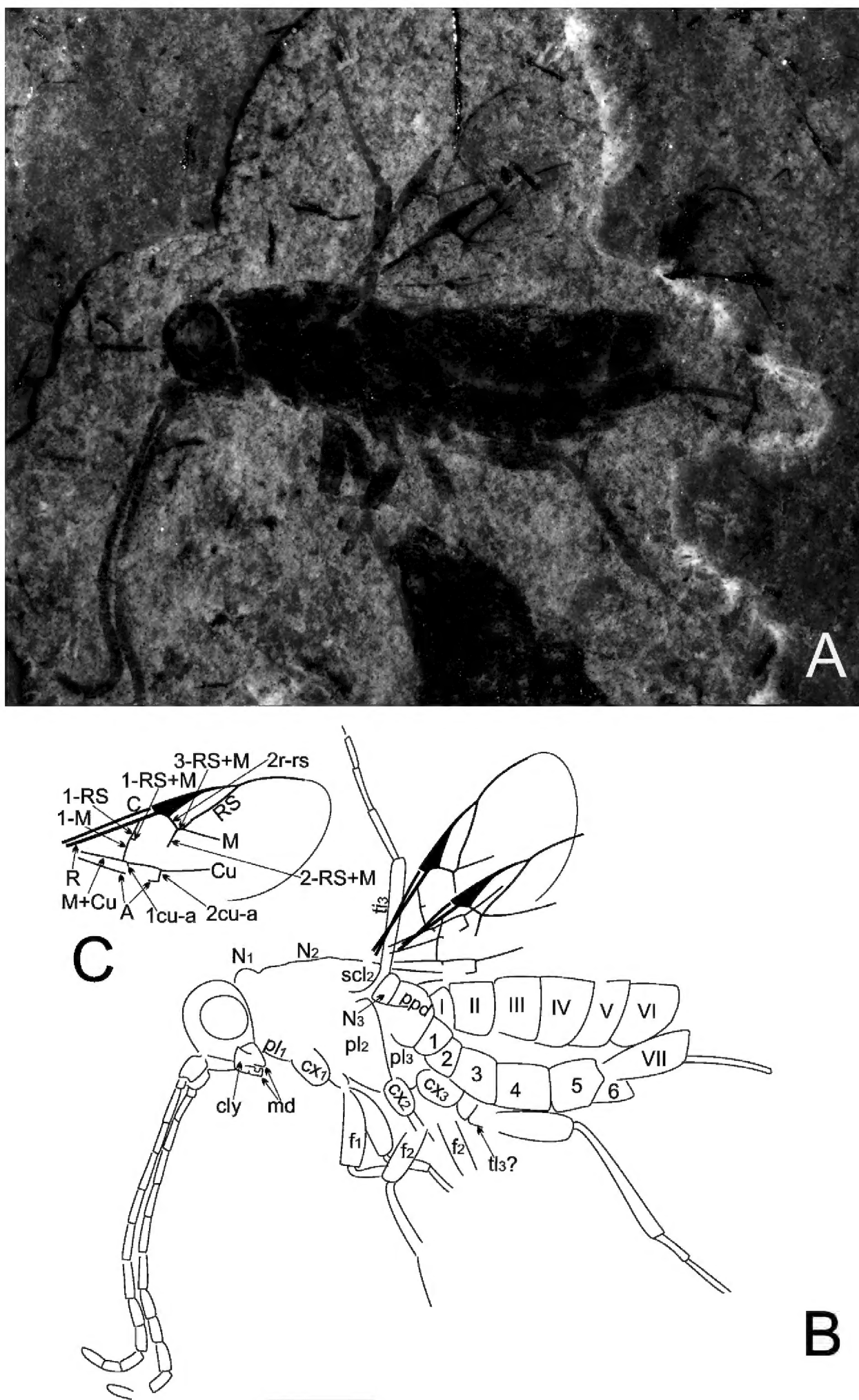
**Diagnosis.** Same as for the genus because of monotypy.

**Description. Female** (male unknown). As preserved, body and appendages dark except that fore and mid tibiae, tarsi and hind tarsi distally paler.

**Head:** Rather small (in side view), eyes large, almost perfectly circular, distant from mandible base for less than basal width of mandible, temples very narrow, clypeus rather long, with details obscure. Antenna 13-segmented, long (probably reaching half-length of metasoma), with scape thick, ca. 1.5× as long as wide, pedicel small, subquadrate in side view, flagellomeres 1–6 similar in length and width, about as long as scape and pedicel combined and slightly narrower than pedicel, following flagellomeres distinctly shorter and wider, with apical segment longest. Mandibles of medium size, apparently narrowed apically and with two apical teeth.

**Mesosoma:** Details rather obscure, pronotum convex and moderately narrow dorsally, mesonotum weakly convex, occupying more than half of mesosoma dorsum, metanotum moderately short, convex, propodeum also moderately short, convex. Coxae medium-sized, hind ones moderately enlarged, fore and middle trochanters rather thin, elongate, hind one wider, possibly subquadrate, trochantelli not visible except possibly hind one, if correctly interpreted, of size similar to that of hind trochanter. Femora short and moderately thick (about 3.0–3.3× as long as wide), most tibiae thin and short, but hind one very long (ca. 1.7× as long as femur). Forewing ca. 2.5× as long as wide, with pterostigma dark, 3.3× as long as wide, with 2r-rs near its base, RS base distant from pterostigma at length of 1–RS, 2r-rs almost as long as 1–RS, 2–RS+M as long as 1–RS, 3–RS+M very short and of different length in right and left wings, cell 3r (marginal) ca. 0.8× as long as its distance to wing apex, Cu with very slight kinks at 1cu-a and 2cu-a, 1–Cu ca. 0.5× as long as 2cu-a, 2cu-a complete, meeting A at right angle. Hind wing with only R visible.

**Metasoma:** Somewhat distended because of postmortem decomposition, preserved subovate, slightly longer than head and mesosoma combined, widely con-



**Figure 1.** *Arkadiserphus leleji* sp. nov., holotype **A** general appearance, side view **B** interpretation (cly, clypeus; cx<sub>1</sub>, cx<sub>2</sub>, cx<sub>3</sub>, pro-, meso- and metacoxa; f<sub>1</sub>, f<sub>2</sub>, pro- and mesofemur; md, mandible; N<sub>1</sub>, N<sub>2</sub>, N<sub>3</sub>, pro-, meso- and metanotum; ppd, propodeum; scl<sub>2</sub>, mesoscutellum; ti<sub>3</sub>, hind tibia; tl<sub>3</sub>, hind trochantel-lus; I–VII, metasomal terga; 1–6, metasomal sterna) **C** fore wing (vein names standard). Scale bar: 1 mm.

nected with propodeum, with all visible terga and sterna free (apical terga apparently hidden under 7<sup>th</sup> one), neither strongly shortened nor elongate but some of them (terga I, V, VII and sterna 1, 2, 6) 0.5–0.7× as long as others. Ovipositor sheaths thin, slightly bent downward, their visible parts as long as pterostigma and marginal cell combined.

**Measurements (mm).** Length of body 4.8, head 0.63, antenna 3.62, mesosoma 1.89, fore femur 0.69, fore tibia 0.44, mid tibia 0.71, hind tibia 1.36, fore wing 2.64, metasoma 2.56, ovipositor sheath 0.82.

**Material.** Holotype only.

**Etymology.** Species name is also dedicated to Prof. Arkady Lelej.

## Discussion

The new genus is attributed to the family Peleserphidae based on RS extended distally up to 2r-rs or beyond it. Putatively this character represents a synapomorphy of the family which is unique of all Proctotrupomorpha, if not Hymenoptera in general. Otherwise, *Arkadiserphus* and Peleserphidae as a whole are most similar to Mesoserphidae, the basal family of Proctotrupomorpha, in having ovipositor external and metasomal segmentation more or less homonomous (with no petiolar segment and no terga strongly enlarged or fused together). In respect to other known genera of Peleserphidae, namely *Peleserphus* and *Peleproctus*, *Arkadiserphus* displays both putative synapomorphies (antenna oligomeric and crossvein 1m-cu totally lost) and plesiomorphies (head orthognathous but not large, rudimentary 1–RS+M present, Cu with rudimentary kinks at 1cu-a and 2cu-a, 1cu-a postfurcal, and hypopygium moderately long). In spite of these differences, it seems to be premature to set a distinction of the subfamily level within a family embracing only three genera and four species as well as four specimens.

Concerning its biology, morphology of the new genus gives little evidence of that kind, so it is possible only to repeat what was earlier suggested for the Peleserphidae in general based on the hitherto known material: “these wasps had a host, possibly a holometabolous larva, concealed within a substrate, perhaps wood or the like” (Zhang et al. 2018: 71). Unlike this, the very finding of the new genus in Angaraland adds considerably to our knowledge about the distribution of Peleserphidae in time and space. The family has evidently originated at least in the Late Jurassic and reached the West Burma plate in the midst of the Tethys Ocean not later than mid-Cretaceous. Unfortunately, nothing can be concluded at present about particular routes of migration, whether these insects spread directly overseas, or from Angaraland via the Gondwana continent (the West Burma plate has separated from the Australian part of Gondwana some 156 Ma ago; Seton et al. 2012). Or else Peleserphidae might originate in the Gondwana and then migrate independently to the West Burma plate and to the Angaraland not after Late Jurassic. An evidence of the latter version could be a record of Peleserphidae in Jurassic deposits of Gondwana.



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